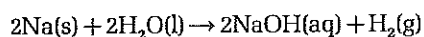


13.1 Group I metals and water



The Group I metals are known as **alkali metals**. This is because they react with water to produce alkaline solutions. For example, sodium reacts with water to form sodium hydroxide.



A lot of heat is produced during this reaction. This causes the metal to melt and often burst into flames.

Alkali metals are stored under oil to protect them from air and water. The oil can be removed with a solvent such as hexane.

The alkali metals are soft silvery metals. They can easily be cut with a knife. They are all good conductors of heat and electricity. They also have low densities and so float on water (as they react!).

Aim

To investigate the reactions of sodium, potassium, and lithium with water.

Apparatus and materials

Safety screen
Three glass troughs
Three beakers, 100 cm³
Scalpel
Tweezers
Distilled water to fill the troughs
Universal Indicator solution
pH chart
Filter paper
Hexane
Sodium
Lithium
Potassium

Precaution

Serious explosions have occurred when adding large quantities of alkali metals to water. Small pieces of metal should be used together with a safety screen.

Procedure

- 1 Fill a glass trough nearly to the top with distilled water.

- 2 Remove a piece of sodium from a stock bottle. Hold the piece of sodium with a pair of tweezers. Use a scalpel to cut off a piece of metal, no more than the size of half a pea.
- 3 Use the pair of tweezers to dip the piece of sodium into a beaker of hexane.
- 4 Remove the excess hexane from the sodium with filter paper.
- 5 Use tweezers to drop the sodium into the middle of the water in the trough.
- 6 When the reaction is complete take a sample of water with a beaker.
- 7 Add ten drops of Universal Indicator solution to the water. Record the colour and determine the pH.
- 8 Repeat steps 1–7 with lithium and potassium.

Results

Copy and complete the following table:

metal	observations	reactivity order	pH of solution
sodium			
lithium			
potassium			

Place the three metals in order of their reactivity with water.

Extra work

- The movement of the metals across the water can be prevented by using a piece of filter paper. Drop a small slice of the metal onto a filter paper floating on the surface of the water.

Questions

- 1 a) Why is sodium known as an alkali metal?
b) Why is it necessary to clean a piece of potassium with hexane?
c) Why is a glass trough used rather than a beaker?
d) Suggest a reason why Universal Indicator solution is not added to the trough?
e) Suggest two reasons why rubidium is not used in this experiment.